SPI-M-O
Medium-Term Projections

16th March 2022

SPI-M-O Medium-Term Projections

- **These projections are not forecasts or predictions**. **They represent a scenario in which the trajectory of the epidemic continues to follow the trends that were seen in the data available to 14th March.** The delay between infection, developing symptoms, the need for hospital care, and death means they cannot fully reflect the impact of policy and behavioural changes made in the two to three weeks prior to 14th March.
- **These projections do not include the potential effects of any novel variants.** The delay between infection, developing symptoms, the need for hospital care, and death means it is unlikely that a novel variant will significantly alter the trajectories of hospitalisations and deaths in the timescales covered by these projections.
- **Changes to data streams, testing policy and behaviour mean SPI-M-O is less certain about these projections than usual.** Producing reliable projections is challenging when the trajectory of the epidemic is turning and trends in different data streams conflict.
- **The projections do not include the effects of any future policy or behavioural changes.**
- **The projections include the impact of vaccines given over the next three weeks.** It will take time for the continued rollout of doses to impact the epidemic, given lags between vaccination and protection, and between infection and hospital admission.
- Modelling groups have used their expert judgement and evidence from the UK Health Security Agency and other published efficacy studies when making assumptions about vaccine effectiveness.
- Not all modelling groups produce projections for both hospitalisations and deaths, so there will be some differences between the models included in the combined projections for each metric.

Metrics:

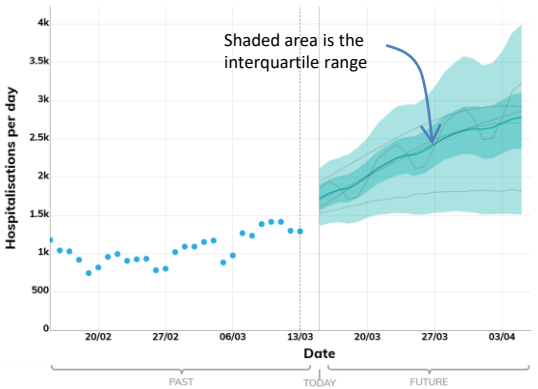
- **New hospitalisations per day:** Number of individuals admitted with COVID-19 and inpatients newly diagnosed with COVID-19. Data definitions differ slightly across all four nations.
- **New deaths per day (by date of death):** The number of COVID-19 deaths within 28 days of being identified as a COVID-19 case. Data definitions differ slightly across all four nations.

Modelled projections based on trends to 14th March 2022

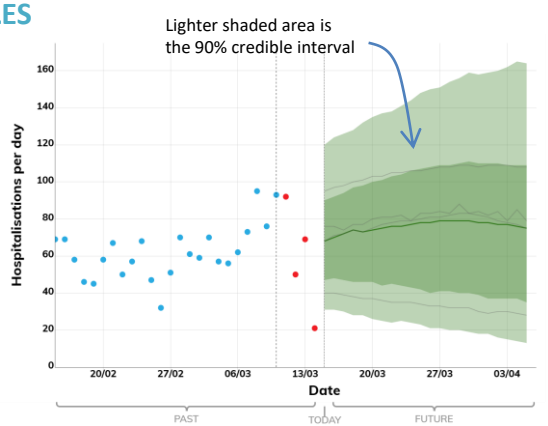
New hospital admissions per day

These projections are based on current trends and will not fully reflect the impact of policy or behavioural changes over the past two to three weeks. These are not forecasts or predictions.

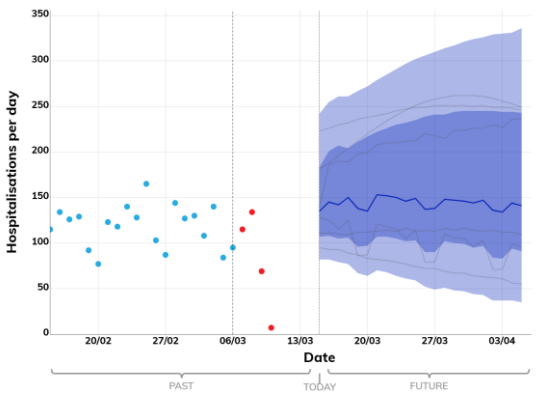
ENGLAND



WALES

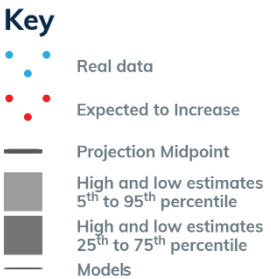


SCOTLAND



NORTHERN IRELAND

SPI-M-O has been unable to produce a consensus projection for hospital admissions in Northern Ireland this week.



The fan charts show the **90% credible interval and interquartile range** of the combined projections based on current trends.

These projections do not include the potential effects of any novel variants. The delay between infection, developing symptoms, the need for hospital care, and death means it is unlikely that a novel variant will significantly alter the trajectories of hospitalisations and deaths in the timescales covered by these projections.

The delay between infection, developing symptoms, the need for hospital care, and death means they cannot fully reflect the impact of policy or behavioural changes in the two to three weeks prior to 14th March. **The projections do not include the effects of any future policy or behavioural changes.**

These projections include the potential impact of vaccines to be given over the next three weeks. It will take time for the continued rollout of doses to impact the epidemic, given lags between vaccination and protection, and between infection and hospital admission.

Data notes:

England: Number of patients admitted with confirmed COVID-19 and the number of inpatients diagnosed with COVID-19 in the past 24 hours. Taken from NHS England COVID-19 situation reports.

Wales: Number of patients admitted with confirmed COVID-19 by admission date and inpatients diagnosed with COVID-19 by test authorisation date. Provided by Public Health Wales.

Scotland: Number of patients who tested positive for COVID-19 in the 14 days prior to admission, on the day of admission, or during their stay in hospital. Readmissions within 14 days of a positive test are excluded. Provided by Public Health Scotland.

Modelled projections based on trends to 14th March 2022

New hospital admissions per day

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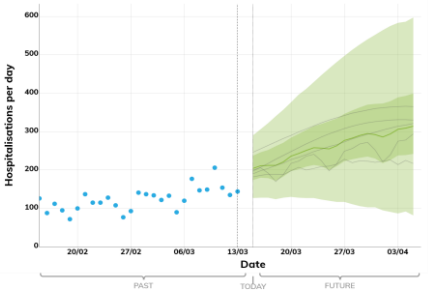
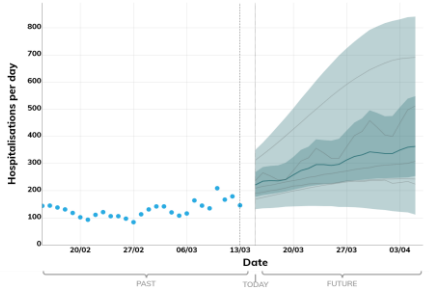
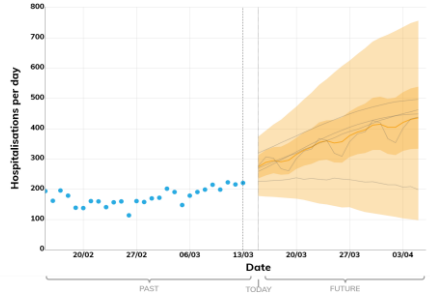
EAST OF ENGLAND



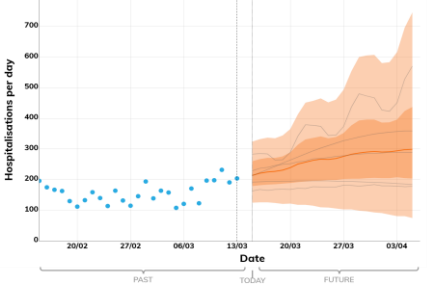
LONDON



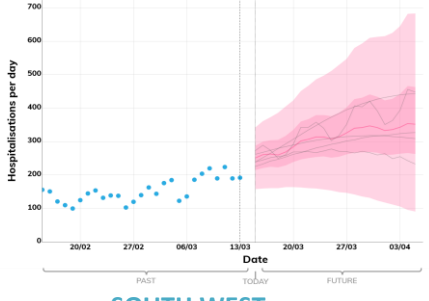
MIDLANDS



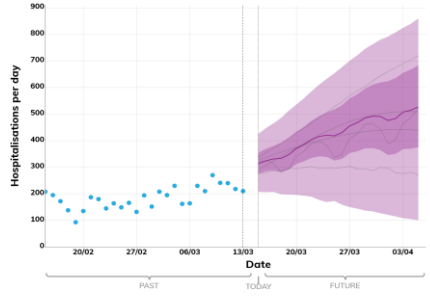
NORTH EAST AND YORKSHIRE



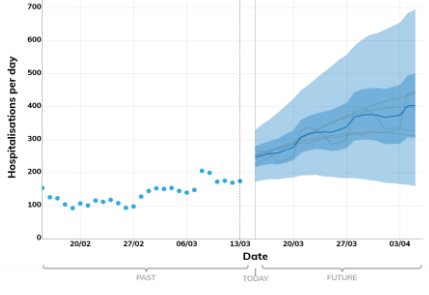
NORTH WEST



SOUTH EAST



SOUTH WEST



Data notes:
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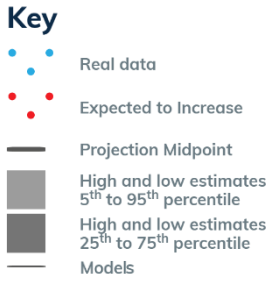

The fan charts show the **90% credible interval and interquartile range** of the combined projections based on current trends.

These projections do not include the potential effects of any novel variants. The delay between infection, developing symptoms, the need for hospital care, and death means it is unlikely that a novel variant will significantly alter the trajectories of hospitalisations and deaths in the timescales covered by these projections.

The delay between infection, developing symptoms, the need for hospital care, and death means they cannot fully reflect the impact of policy or behavioural changes in the two to three weeks prior to 14th March. **The projections do not include the effects of any future policy or behavioural changes.**

These projections include the potential impact of vaccines to be given over the next three weeks. It will take time for the continued rollout of doses to impact the epidemic, given lags between vaccination and protection, and between infection and hospital admission.

Modelled projections based on trends to 14th March 2022

New deaths per day

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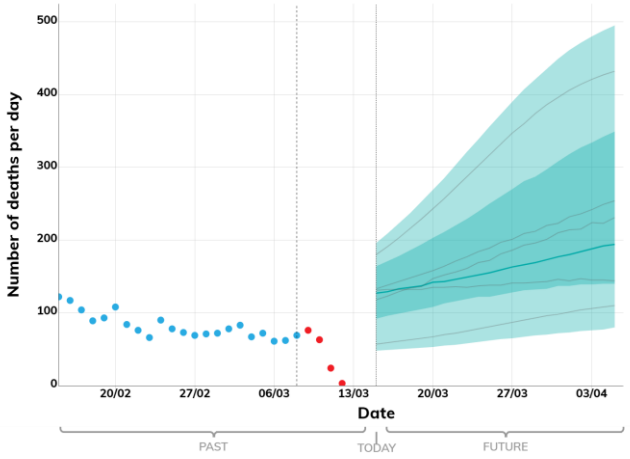
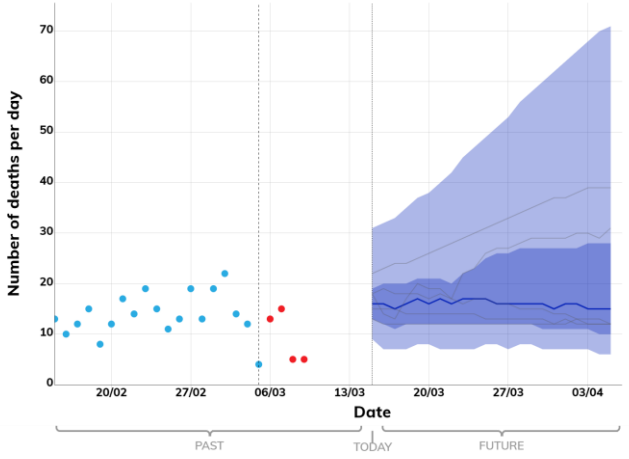
ENGLAND



SCOTLAND



SPI-M-O's consensus view is that the number of deaths in Wales and Northern Ireland will remain low over the next three weeks. The number of deaths in both nations is currently too small for projections to be reliable.

Key

- Real data
- Expected to Increase
- Projection Midpoint
- High and low estimates 5th to 95th percentile
- High and low estimates 25th to 75th percentile
- Models

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Data Notes:
The number of COVID-19 deaths (by date of death) within 28 days of being identified as a COVID-19 case.
The past data for England is taken from the PHE line list of deaths. The past data for Scotland, Wales, and Northern Ireland is taken from the Coronavirus (COVID-19) in the UK dashboard on Gov.uk.

Modelled projections based on trends to 14th March 2022

New deaths per day

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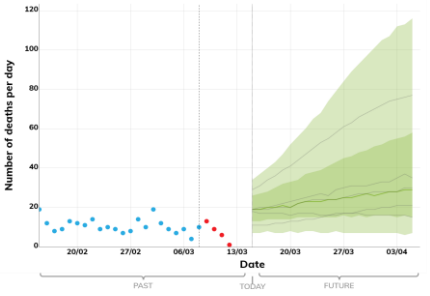
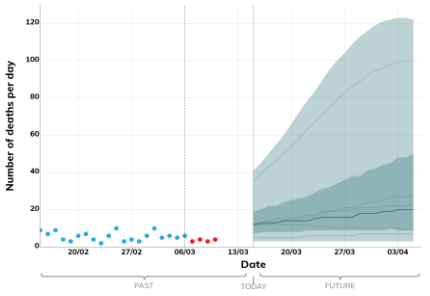
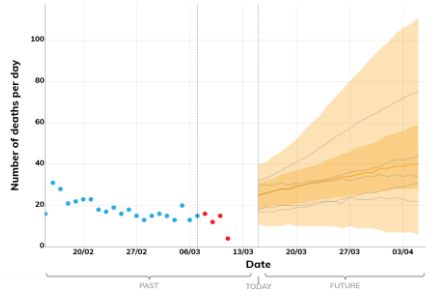
EAST OF ENGLAND



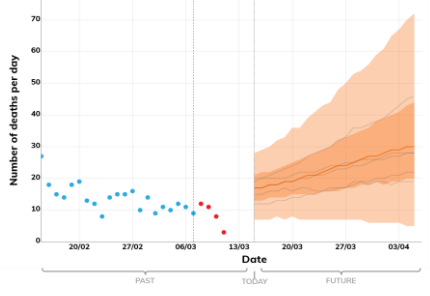
LONDON



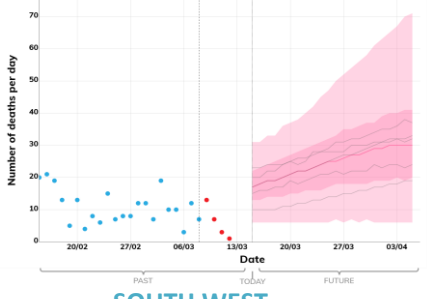
MIDLANDS



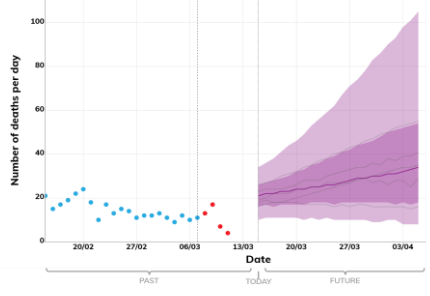
NORTH EAST AND YORKSHIRE



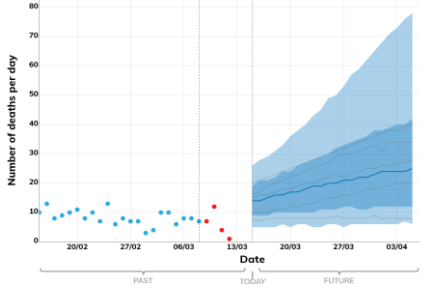
NORTH WEST



SOUTH EAST



SOUTH WEST



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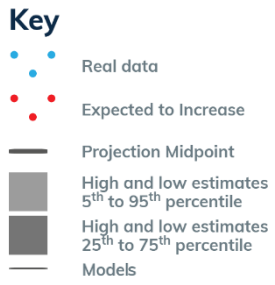

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Annex: SPI-M-O Vaccine Effectiveness Assumptions

Modelling groups have used their expert judgement and evidence from the UK Health Security Agency and other published efficacy studies when making assumptions about vaccine effectiveness. These assumptions are for protection against the Omicron variant.

The LSHTM, Edinburgh, Manchester and Swansea models are also included in the combined projections.

- LSHTM's EpiNow model projects forward based on the recent trends in the data. As a result, the protection provided by vaccinations given to date is implicitly included in the projections produced by the model.
- Edinburgh's WSS model fits to data from October 2020 to describe the effectiveness of vaccinations at reducing the risk of hospitalisation and death. These vaccine efficacy estimates are then used when projecting forwards in time.
- Manchester's model takes a simpler approach to vaccination. Vaccinated individuals are assumed to have a 75% probability of becoming immune to infection. With the remaining 25% probability, individuals remain susceptible, have no reduced risk of hospitalisation and death, and no reduction in risk of onwards transmission. Individuals can be randomly selected to be re-vaccinated multiple times, with the same probability of the vaccine conferring full protection or failing.
- Swansea's model includes a parameter estimating the total percentage of background immunity, whether this is natural immunity or vaccine acquired immunity from a primary course. The model then includes assumptions regarding the additional protection offered by booster doses.

		mRNA Primary, mRNA Booster			Oxford AstraZeneca, mRNA Booster		
		1 dose	2 doses	Booster [6]	1 dose	2 doses	Booster [6]
Reduction in risk of infection [1]	Warwick [2]	10%	50%	60%	10%	30%	60%
	Imperial [3]	13%	60%	68%	13%	31%	68%
	PHE/Cambridge [2]	4%	10%	65%	0%	0%	65%
	Scottish Government [2,4]	Pfizer BioNTech: 33% Moderna: 45%	Pfizer BioNTech: 65% Moderna: 75%	Pfizer BioNTech: 70% Moderna: 70%	24%	45%	60%
Reduction in risk of onward transmission, in addition to reduction from lower infection risk [1]	Warwick [2]	20%	30%	30%	20%	30%	30%
	Imperial [3]	14%	14%	22%	14%	14%	22%
	PHE/Cambridge [2,5]	-	-	-	-	-	-
	Scottish Government [2,4]	Pfizer BioNTech: 15% Moderna: 15%	Pfizer BioNTech: 50% Moderna: 50%	Pfizer BioNTech: 50% Moderna: 50%	5%	25%	25%
Reduction in risk of hospitalisation [1]	Warwick [2]	40%	85%	95%	40%	75%	95%
	Imperial [3]	49%	94%	93%	49%	86%	93%
	PHE/Cambridge [2]	35%	45%	88%	30%	40%	88%
	Scottish Government [2,4]	Pfizer BioNTech: 70% Moderna: 56%	Pfizer BioNTech: 87% Moderna: 87%	Pfizer BioNTech: 89% Moderna: 89%	75%	91%	91%
Reduction in risk of death [1]	Warwick [2]	40%	90%	95%	40%	90%	95%
	Imperial [3]	50%	94%	93%	50%	87%	93%
	PHE/Cambridge [2]	50%	60%	92%	45%	55%	92%
	Scottish Government [2,4]	Pfizer BioNTech: 70% Moderna: 56%	Pfizer BioNTech: 87% Moderna: 87%	Pfizer BioNTech: 89% Moderna: 89%	75%	91%	91%

[1] The assumed delay between vaccination and protection varies between 10 and 21 days for dose 1 and between 7 and 21 days for subsequent doses across the modelling groups.

[2] Warwick uses a multi-stage model to capture waning vaccine effectiveness against infection, hospital admission and death, for different variants of concern. The PHE/Cambridge assumptions provided are for current vaccine effectiveness, so account for waning. The Scottish Government model makes an adjustment to vaccine efficacy to account for waning protection over time. This is done by calculating the time since a person received their last vaccination and matching this to the reduction in vaccine effectiveness from a UKHSA study.

[3] Imperial's model considers waning of vaccine induced immunity to follow an exponential distribution, with a mean time from 2nd dose to waned of 24 weeks, with individuals in the waned compartment having vaccine efficacy reduced from dose two levels to waned levels. In some cases, Imperial's vaccine efficacy for boosters is less than vaccine efficacy for a second dose. These apparent differences are because booster vaccine efficacy considers the mean vaccine efficacy for the first 60 days following booster, whereas second dose vaccine efficacy value here is the highest starting point before the model's waning mechanism takes effect.

[4] The Scottish Government model has different assumptions for the Pfizer-BioNTech and Moderna vaccines. The booster efficacy assumptions are based on the Pfizer-BioNTech vaccine only, which is why there are some inconsistencies compared to the protection provided by 2 doses of Moderna.

[5] The PHE/ Cambridge model does not include a reduction in the risk of onwards transmission after receiving either vaccine.

[6] It is assumed that the booster doses administered will be one of the two mRNA vaccines (either Pfizer BioNTech or Moderna), as per advice from JCVI. A small amount of Oxford-AstraZeneca has been administered as a booster however, this will have a very limited impact on these projections and so is not included in these assumptions.